Android-based MobApp for Academic Services: The Case of Saudi Electronic University

Jaber Al-Adwani[1]& Samer Atawneh
Saudi Electronic University Riyadh 11673, Saudi Arabia
Adwani2006@gmail.com, satawneh@seu.edu.sa

* Corresponding author: Tel: +966112613500

Abstract—Currently Saudi Electronic University (SEU) uses a range of e-learning systems and e-services intendedfor addressing many problems that are faced bythe college'sstaff, and administrative departments. These systems areproviding a Banner system that offers important academic services for both students and instructors. However, at critical periods especially during the start of each academic semester, the SEU students could face many difficulties with the Banner system due to the large numbers of students who are accessing the system simultaneously, and due to the long queue at the registrar office. This paper proposes anAndroid-basedmobile version (MobApp) that enables students to register their courses, and performmany important academic services such as adding or dropping courses, observing andmodifying their schedules, and calculating their tuition fees for the registered courses through their smartphones. The proposed SEU e-services MobApp is easy to download and install, ease of use, provides user friendly interface, and has a powerful steady performance.

***Keywords**-SEU;Banner system;MobApp; Academic Services; Quality Attributes*

I. INTRODUCTION

Smartphones have become the sole gatekeeper for much of valuable, irreplaceable personal information [1]. The global dissemination of smartphones has completely changed the data consumption behavior of people during the past decade [2]. Moreover, the development of smartphone applications has recently emerged as one of the most focused software industry areas [3]. The growing popularity of smartphone applications and technologies lead many companies to develop relationships with customers through smartphone applications [4]. Academic services are the most important and essential services needed for any university-level student. Typically, this type of services arebeing provided through a very limited options such as the student's university main portal (Banner system at SEU), or through the university website of the educational department which the student enrolled in, and through the administrator of the admission and student affairs department. Recently, accessing and performingsuch academic services through MobApps become most widely popular and more likable. The reasons behind that are the features they provide to their users such as mobility, connectivity,and the easiness of this technology especially for all students which can be used as an alternative option to access and performsuch services since the majority for them isto use their mobiles on a daily basis.Today, many universities are using MobApps to support various activities in education process, such as remote access to information services and supporting learning activities (e.g., lectures, exams… etc.) [5]. The open nature of the Android OS facilitates the incorporation of the third-party applications that are running on the top of Android-based devices[6].The aim of this paper is to propose and develop an Android-based MobApp allowsSEU student's to performmany of the most required academic services such as viewing the list of offered courses along with all the course registration actions (addition or dropping), provides the same features provided by the university's main portal (Banner system) through this MobApp. In addition, the proposed MobAppprovides an alternative solution to solvesome of the academic services problems such as the high load on the university's main portal, and many problems faced many students during the registration courses periods at the beginning of each semester.

The rest of this paper is organized as follows. Section II briefly reviews two similar MobApps. Sections III presents the proposed SEU e-services MobApp. Section IV presents the discussion and evaluationof the proposed SEU e-services MobApp. Finally, Section V draws the conclusions.

II. LITERATURE REVIEW

There are quite a good number of similar MobApp used in many other universities, these MobApps could be used to provide the above mentioned academic services for university' students. Moreover, some of these apps have more extra features than others; the reason behind this is that eachMobAppwasdeveloped based on the features available at the main portal for that university. This section reviews two similar MobApps, exploringtheir capabilities, and the services they provided. The two MobApps are King Saud University (KSU) e-services[7] and University of Jordan registration[8] MobApps.

A. King Saud University (e-services) application
King Saud University MobApp offers a group of services for their students. Those servicesare offered in order to fulfill some of thee-services goals, andto deliver those services within an easy and interactive way, and overwhelming user

experience. The smartphone MobAppis able to provide the students with the following services:

- Ability to display the student's academic record and details for each semester.
- Ability to display the student's rewards
- Ability to display the student's loans.
- Ability to display the student's requests.

However, one of the main disadvantages of this MobApp is the language it supports. In this MobAppEnglish language is not supported whichdirectly diminished thecategory of users (students) who can interact and use this MobApp. This MobApp provided with Arabic interface and in this case only Arabic students are able to use it. Figure1 illustrates King Saud University Application login and main interface screens.
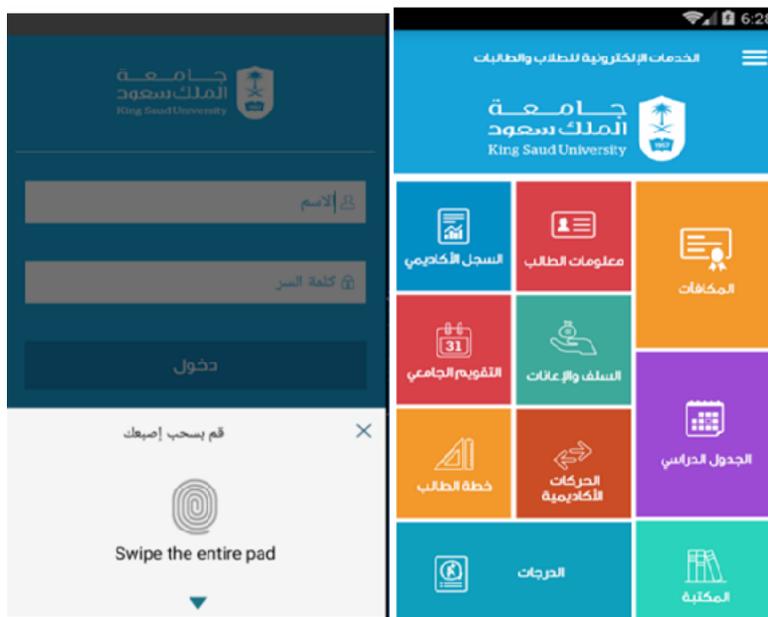

Figure 1. KSU e-servicesLogin and Main Interface

B. University of Jordan registration system

Recently, the University of Jordanbegan providing self-registration servicesmartphones MobApp through. This MobAppprovides students with a range of registration services such as adding, dropping, and modifying the registered courses, the ability to inquire about the academic results, the study plan,and the absence record, as well as receiving circular and advertisement messages which might concern the student.

Moreover; the above mentioned MobApp is also able to send important notices to the students through their mobiles about the exams results, and the grades.On other hand , one of the main disadvantages of this application is that students will not have the ability to inquire about their tuition fees for the registered courses, which is one of the most important services for must be provide for all students.Figure 2: illustrates University of Jordan Application login and registered courses screens.
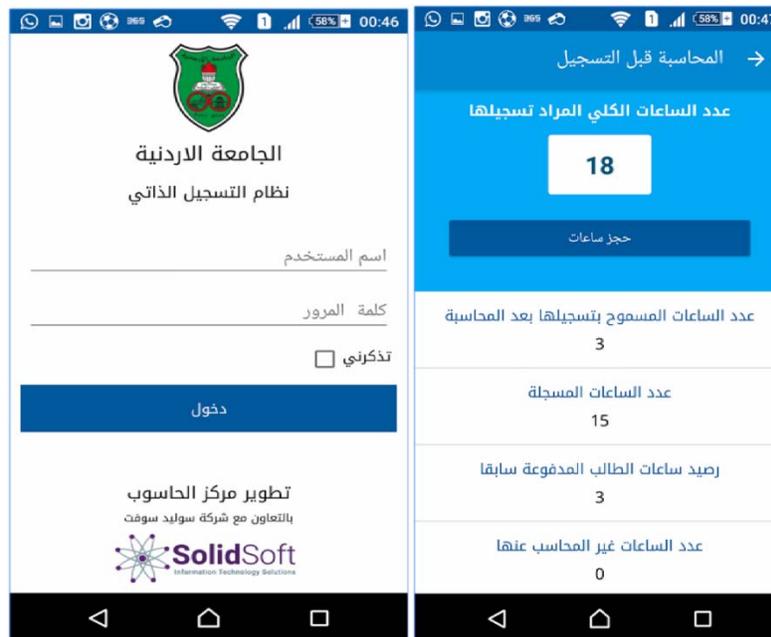
Figure 2.University of Jordan registration application

III. PROPOSED SEU E-SERVICES MOBAPP

This section provides full description about the proposed SEU e-services MobApp. The main e-services that provided to the students along with the types of the users who can interact and use this application will be discussed. The Environment Platform and the assumptions will be discussed in this part as well.

A. *Types of Users and SEU Main e-services*

Two classes of users will be able to use the proposed SEU e-services MobApp; these types are Students and Administrator classes. The first Class type is student which is the primary focus class in this case where the main goal of this MobApp is to make students able to access and perform the available academic services through their smartphones and carry out all available services such as course registering, course dropping, and viewing their weekly schedules. The second class type is Administrator; this type of user has extensive privileges over the SEU e-services MobApp and full controls over the all activities being performed by the first class type (students). Moreover; the administrator has the ability to manage the provided list of the academic services, view, edit, add and delete any services from that list. Moreover, the administrator can modifythe application assets files and handlethe help requests and feedbacks from the users. Figure 3 illustrates the classes' users of the proposed MobApp.
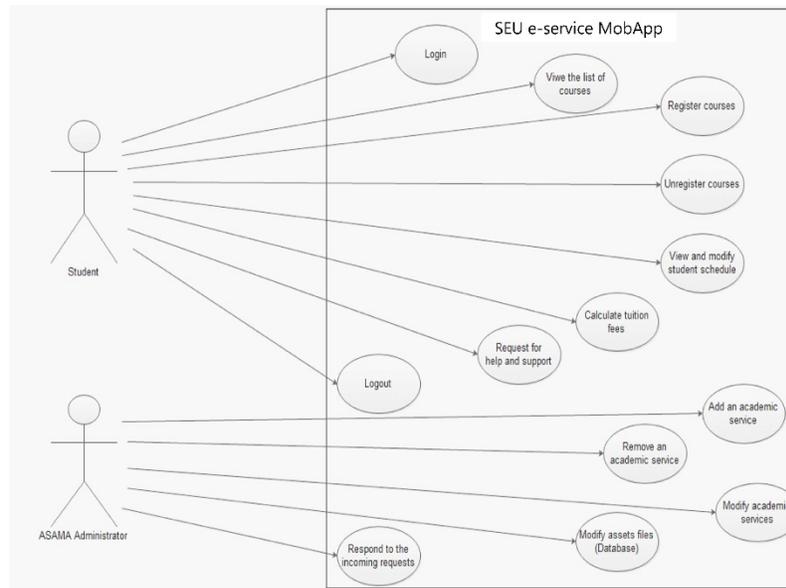
Figure 3. Use-Case Diagram of SEU e-service MobApp

Referencing to Figure 3, the student as one of the users will be provided with a set of main functions. These functions will allow student to Login, view list of offered courses, view register courses, view unregister courses, view the student's schedule and student logout. The administrator user will has full management power over the MobApp as discussed in the previous part.

As conclusion to the previous discussion, the main e-services that will be provided the student as primary focus class by using this SEU e-services MobApp can be summarized as follows:

•   View all available courses for the current semester.

•   Register/Unregister courses.

•   View the student's schedule.

•   Modify the student's schedule.

•   Calculate the tuition fees for the registered courses.

•   Request for help and support.

•   Give feedback as rating and comments.

B. Environment Platform and Assumptions

The proposed SEU e-services MobApp will run on all Android deviceswithversion of 4.0-4.0.4 (Ice Cream Sandwich) and later. Basically, the MobAppwas developed using Android Studio platform and its supporting library; Java programming language, andGenymotion emulator were used for testing and simulation. Moreover; a list of multiple assumptions were taken into consideration during the implementation stage, these assumptions were selected to support the implementation and to avoid any problem might produce problem for the proposed MobApp. Following are summarizing list of the selected assumptions:

• Each user is responsible for his/her username and password confidentiality.
• The MobApp is related to some of the SEU related systems and resources.
• The mobile OS is Android (v. 4.0 or later).
• The MobApp supports the English language.
• The MobApp is designed to manage and perform all of the tasks and activities responding to the user behavior according to the project requirements.
• TheMobApp depends on some other applications for some of its features such as the email application approved by each user.

- The users of theMobApp must be familiar with the Android OS.
- The users of the MobApp must be currently registered students in the SEU.

IV. SEU E-SERVICES SYSTEM DISCUSSION AND EVALUATION

This section provides all the details about the implementation of the proposed MobApp, the output results, and many other requirements such as: performance, security, software quality attributes.

A. MobApp e-services implementation

Referencing to the pervious sections, MobApp was developed for all Android devices in order to provide the most important e-services required by students though their smartphones. It is important to notice that to avoid any conflict with the main services that provided by the original SEU banner, and to make sure that the database will remains consistence all the time, The MobApp developed based on that banner with direct connection with the centralized Database server. Moreover; using a direct connection will guarantee that any executed database query from the MobApp side will be directly reflected on the main database, this will guarantee that the main database will be always synchronized and consistent between the main banner and the MobApp side. Figure 4: illustrates the deployment diagram of SEU e-services MobApp.
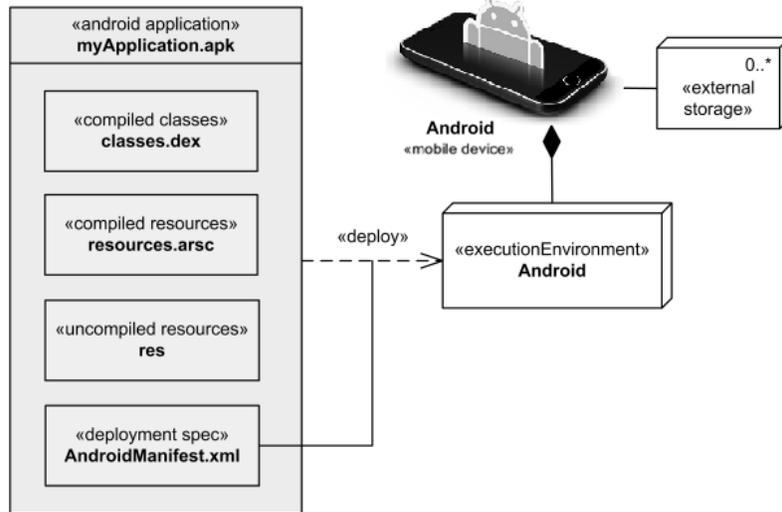

Figure 4. Deployment Diagram of SEU e-service MobApp

B. SEU e-services final application

SEU e-services MobApp successfully achieved all the above mentioned requirements and services which should be provided by this MobApp. Moreover; two main important features were added to the application along with all the main required e-services. The first feature is the ability to support multiple languages instead of single one which was not supported by the MobApp discussed in section II. Students in this case can select either to use English or Arabica user interface. The second feature is the ability to inquire and calculate the tuition fees for the registered courses which not provided by the MobApp discussed in section II as well. For more illustration Figure 5 provides some examples related to the MobApp interface.
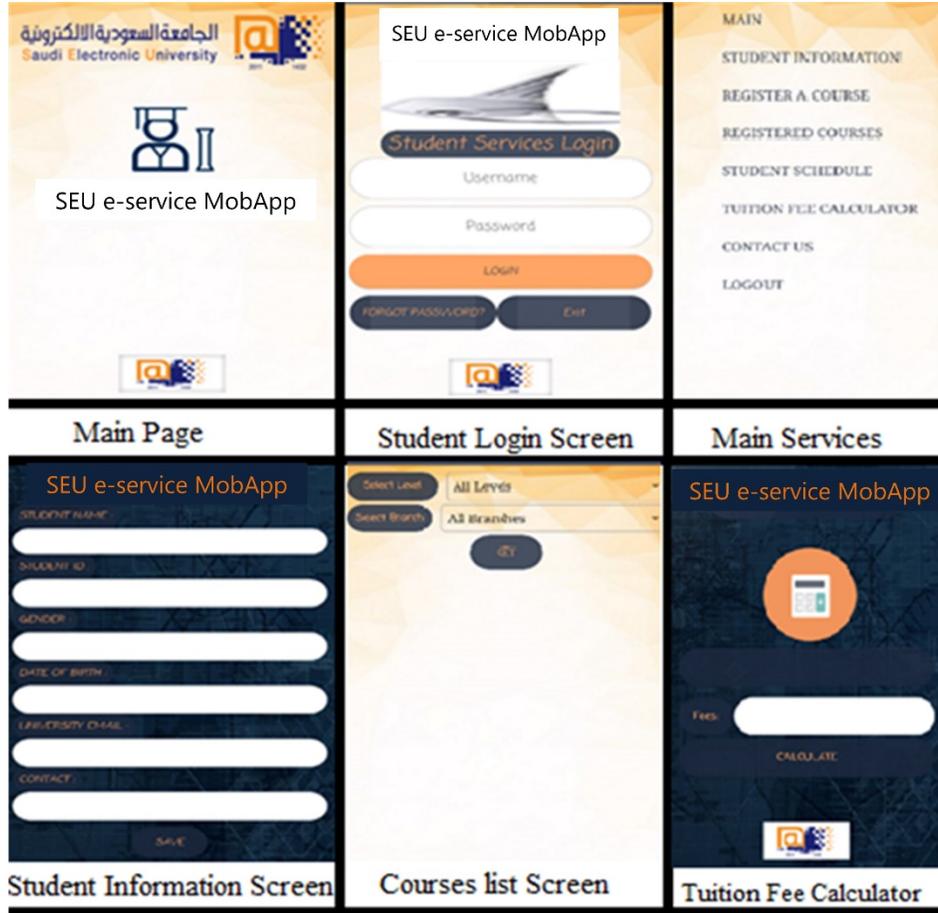
Figure 5. SEU e-services MobApp screens samples

C. SEU e-services Performance, Security and Software Attributes Discussion

The SEU e-services MobApp is developed to operate successfully within a fair spectrum of operating conditions, such as a range of supported screen resolutions, network bandwidth situations and network types (2G, 3G,4G, and Wi-Fi). All important technical issues have been taken into consideration in order to achieve acceptable performancelevel of the proposed MobApp. Moreover; for security requirements, SEU e-services MobApp confirms the execution of activities by displaying a confirmation message for the user. It secures all the user's secure information and never displays a user's password. The user (Student and Administrator) must always sign-out from the current session after finishing using it. The user should alsocheck regularly the Google Play Store for new mobile security updates. Additionally, the user should download a reputable anti-virus software to protect the usedsmartphone from Internet viruses,

malware and unlicensed third-party apps that may steal the user identity, and keep it updated withthe latest Antivirus definition. Finlay, list of quality attributes quality attributes have been taken into consideration when developing the proposed MobApp which can be summarized as the following:

- Efficiency: The SEU e-services MobApp has the ability to perform all the required processing for executing the activities properly.

- Reliability: The SEU e-services MobApp provides support and Feedback features where users can give rating and comments about the MobApp.

- Availability: The SEU e-services MobApp is available to users 24 hours a day, 7 days a week, and provides the courses registration functions during the registration periods for each academic semester.

- Usability: The SEU e-services MobApp has a friendly GUI that matches up with the Banner System at the University portal.

- Compatibility: The SEU e-services MobApp is compatible with any Android based smartphone with the latestAndroid versions.

V.   CONCLUSIONS

This paper presented an alternative mobile-based application for providing SEU studentswith multiple e-services required by all students for the purpose of performing and executing many services traditionally provided by SEU original Banner system. SEU e-services MobApp successfully developed and implemented, archives all the required services which should be provided for all user types. Extra feature to calculate the tuition fees was provided as well.   In term of the performance, security, and software quality attributes,the proposedMobApp is found efficient.

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